Properties of Logs

(P1) $y = B^x$ iff $x = \log_B(y)$

log base b of y

"Solve for exponent"

Ex $100 = 10^x$

(P1)

$x = \log_{10}(100)$

"get rid of a log"

Ex $\log_3(x) = 2$

(P1)

Base 3 → 2.1 $= x$

(A) ← Algebra

$9 = x$

(P2) Sum / Product

$$\log_B M + \log_B N = \log_B (M \cdot N)$$

"combine logs" →

Ex $\log_2 x + \log_2 7 = 3$

(P2)

$\log_2 (7x) = 3$

(P1)

$2^3 = 7x$

(A)

$8 = 7x$

$8/7 = x$

"Finding a comparison"

Ex Given $\log 1.1 = .0414$

Find $\log 11000$

(A)

$\log (1.1 \times 10^4)$

(P2)

$\log 1.1 + \log 10^4$

(A)

$.0414 + 4 = 4.0414$

(P3) "Ladder" Property

$$N \log_B A = \log_B A^N$$

$$\underbrace{\log x + \log x + \log x}_{10} \quad (P2)$$

$$\log x^{10}$$

$$10 \log x = \log x^{10}$$

"Get rid of a coefficient" →

$$5 \log_{10}(x)$$

Ex $10^{\quad}$

(P3)

$$10^{\log_{10}(x)^5}$$

(INV)

$$x^5$$

Ex $2 \cdot \log_{10} 3 + 5 \log_{10} 7$

(P3)

$$\log 3^2 + \log_{10} 7^5$$

(P2)

$$\log_{10}(3^2 \cdot 7^5)$$

"Get an exponent out of logs" ←

$$\log_3 27^{1000}$$

(P3)

$$1000 \cdot \log_3 27$$

(A)

$$1000 \log_3 3^3$$

(INV)

$$1000 \cdot 3$$

(AIS)

$$3000$$

(P4) Change of Base

$$\log_A B = \frac{\log_x B}{\log_x A} = \frac{\log B}{\log A} = \frac{\ln B}{\ln A}$$

"Change the Base"

Ex $\log_3 27 = \ln(27)/\ln(3) = 3$

"Simplify dividing logs"

Ex $\dfrac{\log_7(9)}{\log_7(6)} = \log_6(9)$

(P5) Log of Both Sides

$A = B$ $\quad \log A = \log B$

Take log of Both Sides →

$y = e^x \xrightarrow{(P5)} \ln y = \ln e^x$

$\ln y = x$

← Drop log from both sides

$\log 3 = \log x \quad (P5) \quad 3 = x$

INVERSES

$y = B^x$ inverse $y^{-1} = \log_B x$

$(f \circ f^{-1})(A) = (A)$

$(f^{-1} \circ f)(A) = (A)$

$(f \circ f^{-1})(x) = B^{\log_B x} = x$

$(f^{-1} \circ f)(x) = \log_B B^x = x$

GROUP NAME: Logo:	Student Names (First and Last) Speaker/Presenter: _____
Date: _____ Topics:	Writer/Prep: _____ QC/Leader: _____
Instructions: P1 F	

$Y = 3^1$

$Y^{-1} =$

GROUP NAME:	Student Names (First and Last)
Logo:	Speaker/Presenter:
Date:	Writer/Prep:
Topics:	QC/Leader:
Instructions: P1 R	

$\ln x = 3$

$e^3 = x$

$20.08 = x$

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Logo:	Speaker/Presenter:
Date:	Writer/Prep:
Topics:	QC/Leader:

Instructions:

P2 R

GROUP NAME:	Student Names (First and Last)
Logo:	Speaker/Presenter:
Date:	Writer/Prep:
Topics:	QC/Leader:

Instructions: P3 F

GROUP NAME:	Student Names (First and Last)
Logo:	Speaker/Presenter: Scott
Date:	Writer/Prep: Mengli Guo
Topics:	QC/Leader: Rex

Instructions: P3 R

"Ladder" Property $n\log_b x = \log_b x^n$

$\log_2 8^{1000} = 1000 \log_2 8 = 1000 \log_2 (2)^3 = 1000 \times 3 = 3000$

GROUP NAME:	Student Names (First and Last)
Logo:	Speaker/Presenter: Stan Kaplan
Date:	Writer/Prep: Vaneet Bacchus
Topics:	QC/Leader: Danyan Zhou

Instructions: P4 F

Change the Base

$\log_b x = \frac{\log_a x}{\log_b x}$ = $\log_b a = \frac{\log_c a}{\log_c b}$ =

evaluate a old bases in terms of a new one

ex: find $\log_4$ =

ex: graph $y = \log_x$

GROUP NAME:	Student Names (First and Last)
Logo:	Speaker/Presenter: Athena
Date:	Writer/Prep: Dominique
Topics:	QC/Leader: Trey M

Instructions: P4 R

4. CHANGE OF BASE

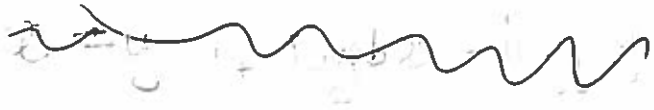
$$\log_b x = \frac{\log_a x}{\log_a b}$$

Reverse: Divide logs of same base to get single log

Ex. Simplify $\ln x / \ln 10 = \log(x)$

GROUP NAME:	Student Names (First and Last)
Logo:	Speaker/Presenter: Erik Hanson
Date:	Writer/Prep: Onur Turkay
Topics:	QC/Leader: Shanon

Instructions: P5 F



$x = y$ if $\log_b x = \log_b y$

Take log of Both Sides

$\ln y = x$

$$\frac{\log_A X}{\log_A B} = \log_B(X)$$

$\log_B X = Y$

$B^Y = X$

$\log_A B^Y = \log_A X$

(P3)

$Y \log_A B = \log_A X$

(A)

$$Y = \frac{\log_A X}{\log_A B}$$

GROUP NAME:	Student Names (First and Last)
Logo:	Speaker/Presenter: Onur Turkan
Date: 10/7/13	Writer/Prep: Avik Khanejo
Topics:	QC/Leader:

Instructions: PS R $\log x = \log 4$ find x $x = y$ if $\log_b x = \log_b y$

$\log x = \log 4$ find x

$x = 4$